



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US93/04366 <b>(22) International Filing Date:</b> 7 May 1993 (07.05.93)  <b>(30) Priority data:</b> 07/880,885                      8 May 1992 (08.05.92)                      US  <b>(71) Applicant:</b> THE WEST COMPANY, INCORPORATED [US/US]; 1041 West Bridge Street, Phoenixville, PA 19460 (US).  <b>(72) Inventor:</b> MC QUAY, Gary, E. ; RD #1, Box 202A, Wat- sontown, PA (US).  <b>(74) Agents:</b> RENZ, Eugene, E., Jr. et al.; 205 North Monroe Street, P.O. Box 2056, Media, PA 19063 (US).		<b>(81) Designated States:</b> CA, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the</i> <i>claims and to be republished in the event of the receipt of</i> <i>amendments.</i>
<b>(54) Title:</b> HINGED TAMPER EVIDENT CLOSURE AND CONTAINER ASSEMBLY		
<div data-bbox="558 1129 1094 1566" data-label="Image"> </div> <p data-bbox="241 1577 358 1602"><b>(57) Abstract</b></p> <p data-bbox="233 1629 1424 1913">A container device (10) comprising a tubular container (11) and a closure member (13). The tubular container includes an open upper terminal end. The tubular container has a radially extending outwardly facing annular ring (25) located at a point axially inward from the upper terminal end of the tubular container. The outwardly facing annular ring includes a first plurality of outwardly facing ribs (27). The closure member includes a second plurality of ribs (31) inwardly facing for mating with the first plurality of ribs and being sized to prevent axial rotation between the container and the closure member when the first and second pluralities of ribs are mated. The closure member includes a cap portion which is sized to engage the upper terminal end of the tubular container with the cap portion being mounted on the closure member in part by a hinge and in part a tear-off band having a pull tab. The container includes an outwardly extending flange (33) proximate the first plurality of outwardly facing ribs for engagement with a groove (35) on the closure member. The groove is sized to snap fit into the flange to prevent separation of the container and the closure member. The tear-off (15) band and the hinge (17) are located between the flange/groove assembly and the open terminal end of the container.</p>		

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HINGED TAMPER EVIDENT CLOSURE AND CONTAINER ASSEMBLYTECHNICAL FIELD

5       The present invention relates to a closure and container assembly in which the cap is hinged to the closure, and more particularly to a tablet vial in which a tamper evident tear strip allows for warning of possible unauthorized intrusion for the protection of the purchaser and user and also forms part of the supporting hinge.

BACKGROUND ART

The field of cap and tube assemblies which carry medicines, vitamins and the like, have become of major importance and interest in the pharmaceutical industry. Those devices which are designed for fluids such as gels, ointments and the like are packaged in unit dosages and in multiple dosages with closures that effectively protect the contents and provide some measure of tamper evidence. There are many such devices for fluid products. At the present time, however, there is no similar package for containing solids such as tablets, pills and lozenges in containers which have a simple and inexpensive tamper evident closure system.

While it is a growing recognition that container assemblies should be difficult for children to open, particularly accidentally, greater concern is for tamper evidence when the products are being used by adults. The field of tamper evident cap and tube assemblies in which medicines, vitamins and the like, are packaged in solid form and which can conveniently and safely be placed in one's pocket or purse have become of major interest in the pharmaceutical industry. For example, many tablet forms of breath mints, antacids, and other over-the-counter products are sold in paper and/or foil rolls or other packages. These packages are not totally free from unnoticed access and some concern for security exists. At the same time, closures and containers combinations which are difficult to open, such as the well known child resistant assemblies, are not convenient for the user when multiple doses are taken from the same container.

In prior art devices, designs have been proposed which include expensive and complicated components which are difficult to manufacture and/or assemble. For example, it is desirable that the cap not be separated

from the container, yet the need of a connecting piece results in a three piece construction. There has not been an effective device proposed for hinging the cap to the container without substantial manufacturing and assembly expensive.

There is another concern that has become important in the child-resistant container industry, and that is the desire that a conscious physical step be needed in order to obtain access to the container. This is desired so that random activity will not give that access. It is also important that it be easy and certain to determine if there has been access to the contents.

This is normally referred to as a "tamper evident" feature, although in many cases the primary function is to provide an inspection means which verifies the integrity of the contents. Stated another way, it is a need in the packaging industry for devices which operate using a readily identifiable step which cannot be avoided if access to the container is to be had.

One of the most desirable elements of such a design is known as a pull-tab strip which is integral with the closure system until access is desired. Then, simply pulling the pull-tab strip removes the barrier to access and provides a clear indication that the contents are now accessible.

Accordingly, it is an object of this invention to provide a tamper evident closure system for packages containing solids such as tablets, pills and the like.

Another object of this invention is to provide a device which is sufficiently complex to prevent random activity from putting the device in a condition for being activated.

Yet another object of the invention is to provide a pull-tab type barrier to access which is simple and economical to manufacture and install.

5        Still another object of this invention is to provide a closure which is simply and economically attached to the container by a hinge which forms part of the assembly.

Other objects will appear hereinafter.

DISCLOSURE OF THE INVENTION

It has now been discovered that the above and other objects of the present invention may be accomplished in the following manner. Specifically, the present invention comprises a container device having a tubular container and a closure member. The tubular container includes an open upper terminal end. The closure member is adapted to fit on this upper terminal end.

The tubular container has a radially extending outwardly facing annular ring having a fixed diameter at a point axially inward from the upper terminal end of the tubular container. The outwardly facing annular ring includes a first plurality of ribs which are outwardly facing. The closure member includes an inwardly facing annular ring having a second similar plurality of ribs facing inwardly. Thus, the ribs face each other for mating, as the diameters of both the ring and the cap are sized so that the ribs mate or fit together to prevent relative rotation between the container and the closure member.

The closure member includes a cap portion which is sized to engage the upper terminal end of the tubular container with the cap portion being mounted on the closure member in part by a hinge and in part by a tear-off band having a pull tab. Removal of the tear-off band allows the cap to be displaced from the open terminal end of the container to provide access to the contents.

In a preferred embodiment, the container includes an outwardly extending flange proximate the outwardly facing ribs for engagement with a groove on the closure member. The groove is sized to snap fit in the flange to prevent separation of the container and the closure member. The tear-off band and the hinge are located

between the flange/groove assembly and the open terminal end of the container.



**BRIEF DESCRIPTION OF THE DRAWINGS**

For a more complete understanding of the invention, reference is hereby made to the drawings, in which:

5        Figure 1 is an enlarged, side elevational view illustrating a tubular container sealed by means of a one piece hinged tamper evident closure member.

Figure 2 is a plan view of the device shown in Fig. 1.

10       Figure 3 is a side elevational view of the device shown in Figs. 1 and 2, showing the device with a tear-off band removed.

Figure 4 is plan view of Fig. 3 illustrating the tear-off band of the device being removed and shown in full line.

15       Figure 5 is a side elevational view of the device of this invention illustrating, in full line, an opened condition of the sealing lid and in do and dash line outline a closed condition of the same sealing lid.

20       Figure 6 is an exploded, isometric view of the device of this invention illustrating the device prior to assembly.

Figure 7a and 7b are greatly enlarged, fragmentary, sectional views taken along the lines 7a, 7a and 7b, 7b respectively of Fig. 6.

25       Figure 8 is a sectional, plan view taken along the line 8, 8 of Fig. 7a.

Figure 9 is a sectional, plan view taken along the line 9, 9 of Fig. 7b.

Figure 10 is an enlarged, fragmentary, sectional elevational view taken along the line 10, 10 of Fig. 2.

5      Figure 11 is a sectional, plan view taken along the line 11, 11 of Fig. 10.

10      Figure 12 is an enlarged, fragmentary, sectional elevational view similar to Fig. 11 and taken along the line 12, 12 of Fig. 4. Also shown in dot and dash outline is the closure lid in a closed and sealing position.

BEST MODE FOR CARRYING OUT THE INVENTION

As set forth above, the present invention has application in a wide variety of industries. The present invention is a particular interest in the pharmaceutical industry where pills, tablets and lozenges are packaged in vials or plastic bottles. In addition, however, the present invention is useful under any circumstances where one or more products are to be packaged in a small vial or bottle with a lid or cap that can easily be removed and remain partially attached to the vial such as with a hinge.

Shown generally in the drawings is a closure system which includes a container or vial 11 and a closure member, shown as cap 13. Cap 13 is attached to the container 11 in part by a tear-off band 15 and in part by hinge 17. Tear-off band 15 is easily removed when the container is to be opened by pulling on pull tab 19 so that tear-off band 15 separates from the closure member, leaving cap 13 free to pivot on hinge 17 as shown in Fig. 5 when pressure is applied to lip 21. Cap 13 is capable of sealing on the upper terminal end 23 of container 11 as shown in dot and dash lines.

The container system shown in Fig. 1 represents the package as it is purchased, with the contents safely protected inside container 11 and with cap 13 securely attached to container 11. The product is safe and is kept free from contamination until it is time for access to the contents. At this time, pull tab 19 is pulled to remove tear-off band 15 by pulling as shown in Fig. 4, resulting in a container with the cap 13 still firmly fitted on the open upper terminal end 23 of container 11, shown in Fig. 3. Pressure on lip 21 allows the cap 13 to be removed from container 11, as shown in Fig. 5, and hinge 17 keeps cap 13 closely associated with container

11 to prevent loss or misplacement of the cap and to permit opening and closing using only one hand. This is particularly important if the user has placed one or more of the tablets or other contents in his or her other hand.

It can easily be seen from Figs. 1-5 that the system is tamper evident. If the tear-off band 15 is in any way disturbed, the purchaser will know this and can take whatever steps are needed to insure safe practice. The band can be inspected at point of purchase and later when the package is first opened at home or elsewhere. Once the tear-off band 15 has been removed, as shown in Fig. 3, the cap 13 is still able to protect the contents since cap 13 fits tightly on open terminal end 23.

Turning now to Fig. 6, the assembly of the device of this invention can be seen. Tubular container 11 includes an annular ring 25 positioned axially inward from the container's upper terminal end 23. On the outside of annular ring 25 are a plurality of outwardly facing ribs 27, shown in Fig. 6 as being axially aligned with the central axis of the container 11. Located on the inside of cap 13 at the open end 29 are a plurality of inwardly facing ribs 31 which are also shown parallel to the central axis of container 11. These inwardly facing ribs 31 mate with outwardly facing 27 to lock the cap 13 on container 11 and prevent relative rotation or twisting when the tear-off band 15 is removed.

It is contemplated that the container systems of the present invention will normally be manufactured by a molding process from plastic. Any moldable resin system is useful, particularly those resin systems which are relatively free from contaminating components which would migrate into the contents of the container. Typical formulations of resin systems are presently available

from a variety of resin manufacturers and formulators. It is an advantage if the particular resin system selected is heat sensitive to the extent that the portion of cap 13 at the open end 29 can conform to the shape of annular ring 25 once the system has been assembled.

Figs. 7a and 7b illustrate further details of assembly and construction of the system in greatly enlarged, sectional detail. In Fig. 7a, the location of ribs 31 with respect to the open terminal end 29 of cap 13 is shown as is the location of tear-off band 15. Located between the tear-off band 15 and the inwardly facing ribs 31 is an annular groove 35. The diameter of the end 29 and inwardly facing ribs 31 is shown by  $D_1$  and the larger diameter of groove 35 is shown by  $D_2$ .

In Fig. 7b, the location of ring 25 is shown with respect to the open upper terminal end 23 of container 11. Also shown in this view are the parallel ribs 27 which are located on ring 25. Positioned just above ribs 27 is an annular flange 33. Flange 33 has a larger diameter  $D_3$  than the ribs 27. Diameter  $D_2$  is the same dimension as diameter  $D_3$ . When cap 13 is placed on container 11, flange 33, shown tapered to assist in assembly of the system, snap fits into groove 35. Because flange 33 has been tapered only in one direction, the force required to remove flange 33 from groove 35 after initial assembly is greater than the normal materials of construction can survive, so that attempts to remove the cap without breaking the cap will not succeed.

Shown in Figs. 8 and 9 are sectional views of the ribs 27 and 31, illustrating how the ribs mate and prevent any twisting of the cap with respect to the container. The top 37 of the material forming groove 35 is visible in Fig. 8 as this portion 37 extends radially

inward further than does the tear-off band 15. Flange 33 and groove 35, along with the pair of ribs 27 and 31, function to permanently locate the cap 13 on container 11.

5           Hinge 17 maintains the attachment of the top of cap 13 to the assembly when tear-off band 15 has been removed, as described above. Shown in Figs. 10, 11 and 12 is an enlarged illustration of the fully assembled device of this invention, both before and after removal  
10 of tear-off band 15. The interlocking relationship of ribs 27 and 31 is seen in Fig. 11.

          Also illustrated in Fig. 10 is the manner in which flange 33 deforms the cap bottom 29 at the center of groove 35, so that the bottom portion 29 of cap 13  
15 conforms to the side of container 11 on both sides of flange 33. This conformity provides for an improved appearance of the design.

          The relationship of the cap 13 and hinge 17 is illustrated in Fig. 12, as pressure on lip 21 opens and  
20 closes the cap on the upper terminal end 23. A sealing ring 39 is provided to give a snug fit and seal protection when the cap 13 is on the end 23 of container 11, shown in dot and dash line in this view.

          While particular embodiments of the present  
25 invention have been illustrated and described, it is not intended to limit the invention, except as defined by the following claims.

CLAIMS

1. A container device, comprising:
  - a tubular container having an open upper terminal end, said tubular container having a radially extending outwardly facing annular ring at a point axially inward from the upper terminal end of the tubular container, said outwardly facing annular ring having a first plurality of outwardly facing ribs; and
  - a closure member having a second plurality of ribs facing inwardly for mating said first plurality and being sized to prevent axial rotation between said container and said closure member when said first and second plurality of ribs are mated;
  - said closure member having a cap portion sized to engage said upper terminal end of said tubular container, said cap portion being mounted on said closure member in part by a hinge means and in part by a tear-off band.
2. The device of claim 1, wherein said container includes an outwardly extending flange proximate said first plurality of ribs for engagement with said closure member to prevent separation of said container and said closure member.
3. The device of claim 2, wherein said closure member includes groove means sized to snap fit over said flange on said container.
4. The device of claim 3, wherein said flange is tapered to permit assembly of said closure member on said container.
5. The device of claim 1, wherein said tear-off band includes a pull tab.

6. The device of claim 5, wherein said tear-off band and said hinge means are positioned between said open terminal end of said container and said flange and groove means.

7. A container device, comprising:

5 a tubular container having an open upper terminal end, said tubular container having a radially extending outwardly facing annular ring at a point axially inward from the upper terminal end of the tubular container, said outwardly facing annular ring having a first plurality of axially extending outwardly facing ribs; and

10 a closure member having a second plurality of axially extending ribs inwardly facing said outwardly facing first plurality of ribs and being sized to prevent axial rotation between said container and said closure member when said first and second pluralities of ribs are mated;

15 said closure member having a cap portion sized to engage said upper terminal end of said tubular container, said cap portion being mounted on said closure member in part by a hinge means and in part by a tear-off band, said tear-off band and said hinge means being  
20 located between said open terminal end of said container and said flange and groove means;

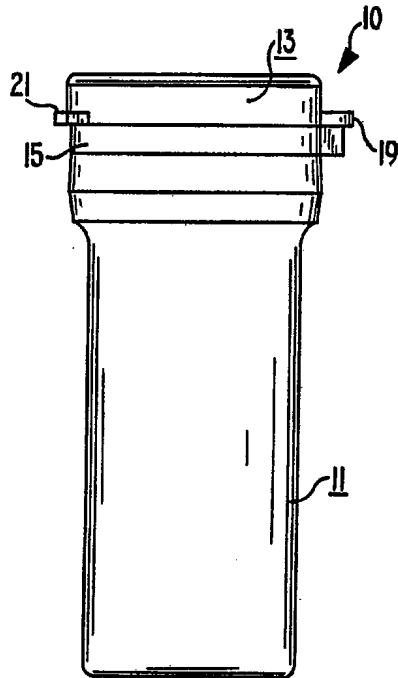
25 said container including an outwardly extending flange proximate said first plurality of outwardly facing ribs for engagement with groove means on said closure member and sized to snap fit in said flange to prevent separation of said container and said closure member.

8. The device of claim 7, wherein said flange is tapered to permit assembly of said closure member on said container.

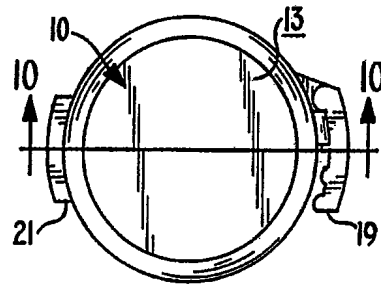


9. The device of claim 7, wherein said tear-off band includes a pull tab.

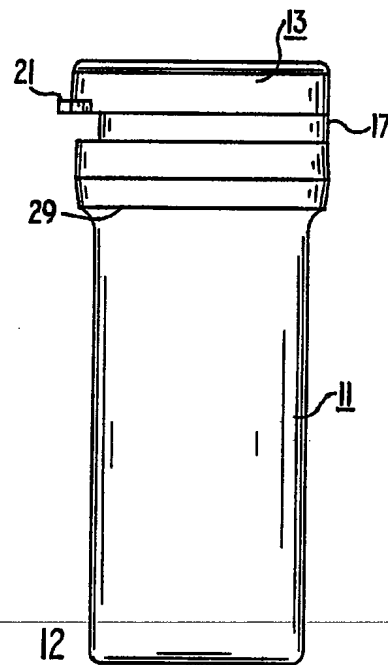
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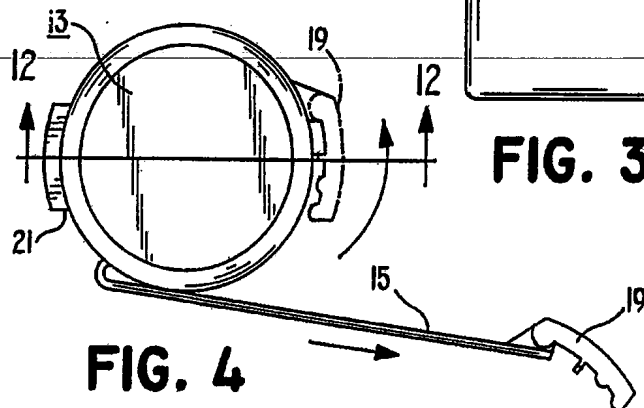
**FIG. 1**



**FIG. 2**



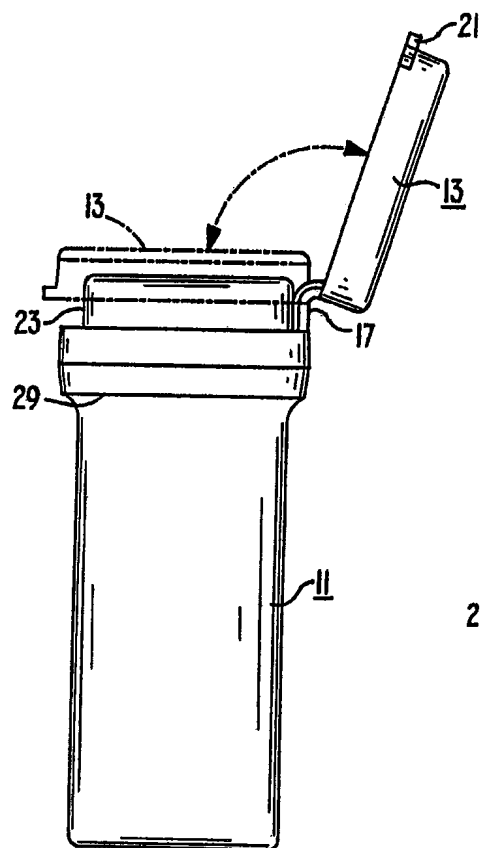
**FIG. 3**



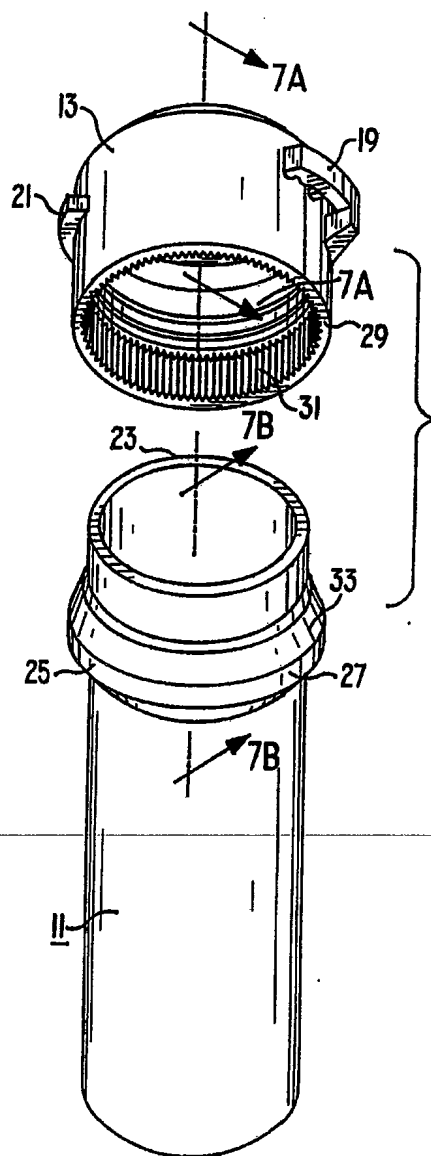
**FIG. 4**

**SUBSTITUTE SHEET**

216

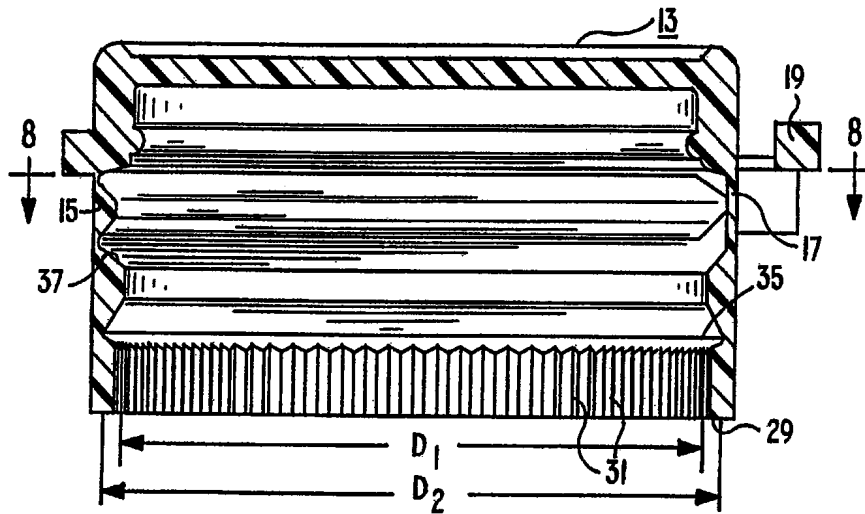


**FIG. 5**

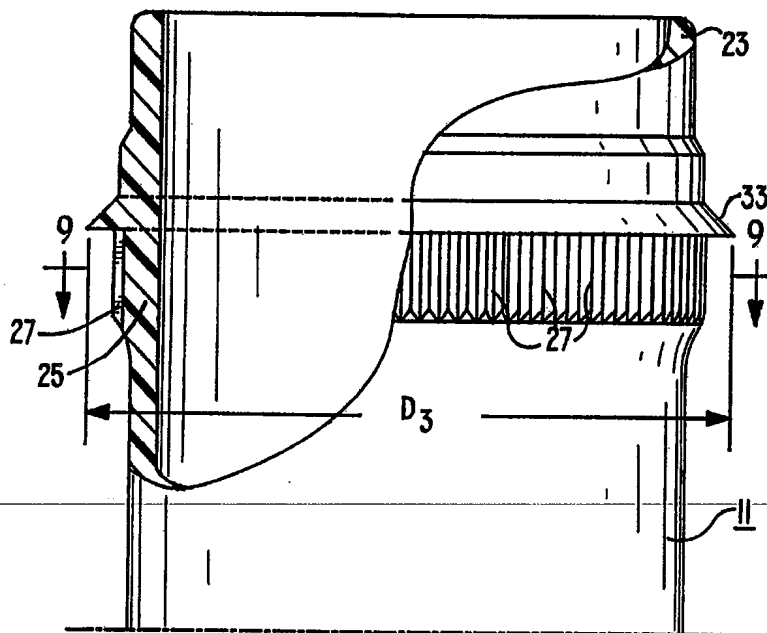


**FIG. 6**

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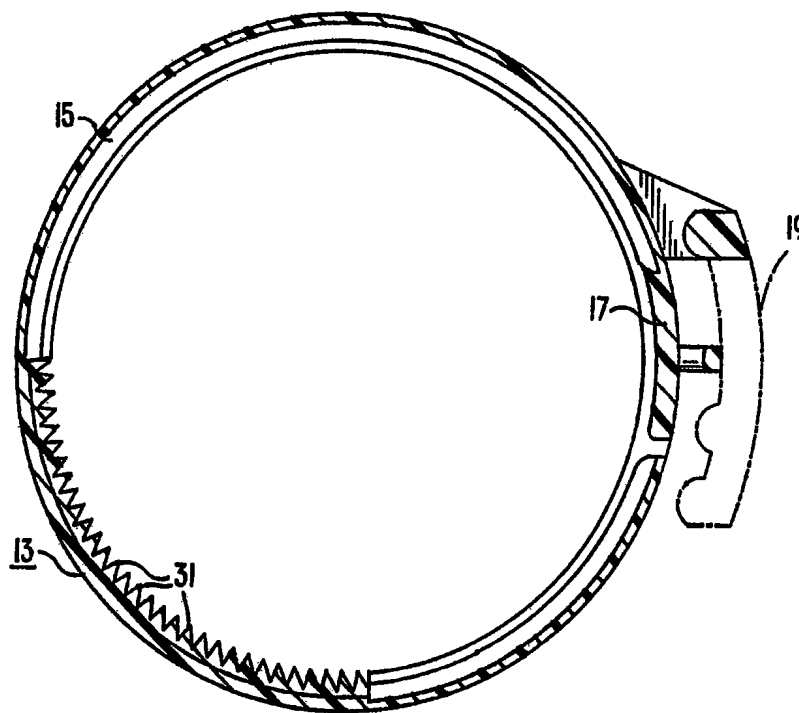


**FIG. 7A**

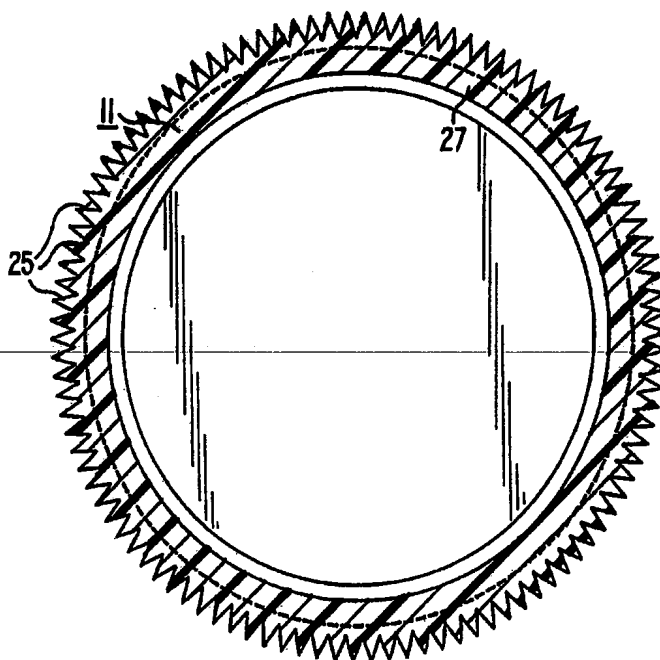


**FIG. 7B**

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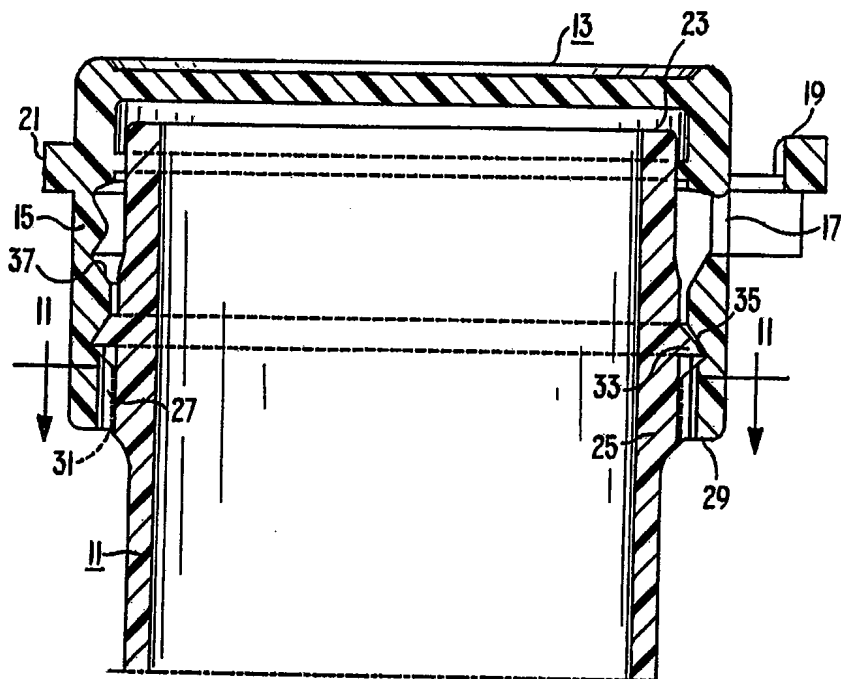


**FIG. 8**

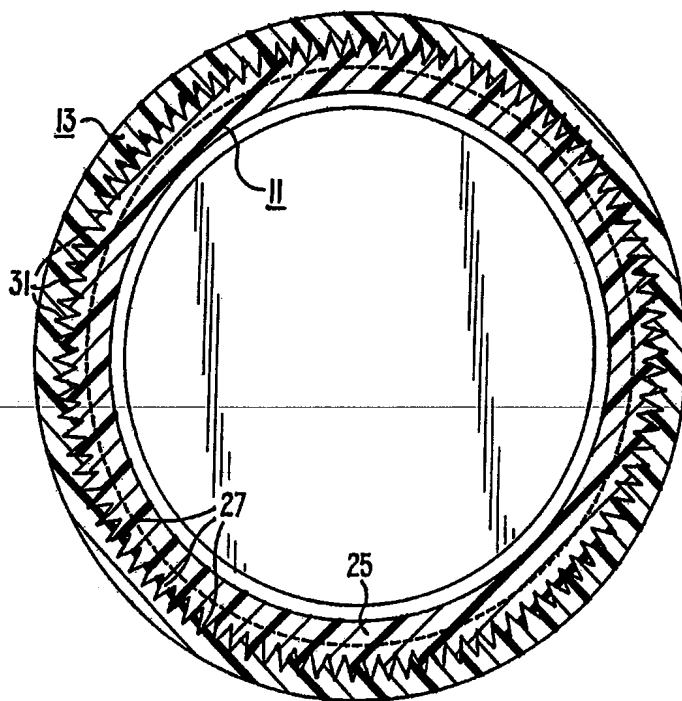


**FIG. 9**  
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**FIG. 10**



**FIG. II**

**SUBSTITUTE SHEET**



## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 93/04366

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 B65D41/48; //B65D101:00		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	B65D	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
Y	US,A,4 919 286 (A.J.AGABY) 24 April 1990 see column 7, line 11 - line 20; figure 1 ---	1-9
Y	DE,A,2 314 864 (G.MENSEHEN) 10 October 1974 see page 7, line 1 - line 12; figures ---	1-9
A	US,A,4 694 971 (T.ELSMO) 22 September 1987 see abstract; figures ---	1,7
P,A	EP,A,0 521 633 (E.E.DAVIS) 7 January 1993 see abstract; figures ---	1,7
A	GB,A,2 116 155 (A.GUALA) 21 September 1983 see abstract; figure 1 ---	1,7
	-/--	
<sup>10</sup> Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
22 SEPTEMBER 1993	29. 09. 93	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	Amedeo ZANGHI	



III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	GB,A,2 203 136 (M.J.HEWETT) 12 October 1988 see abstract; figures -----	1,7

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

US 9304366  
SA 74274

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
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22/09/93

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4919286	24-04-90	None	
DE-A-2314864	10-10-74	None	
US-A-4694971	22-09-87	WO-A- 8902400	23-03-89
EP-A-0521633	07-01-93	None	
GB-A-2116155	21-09-83	AU-A- 1198383	15-09-83
		DE-A- 3307992	22-09-83
		FR-A, B 2523083	16-09-83
		US-A- 4494664	22-01-85
GB-A-2203136	12-10-88	None	